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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/879,554	06/12/2001	James E. Dibb	1956/135	4580
2101	7590	11/22/2004	EXAMINER BADERMAN, SCOTT T	
BROMBERG & SUNSTEIN LLP 125 SUMMER STREET BOSTON, MA 02110-1618			ART UNIT 2113	PAPER NUMBER

DATE MAILED: 11/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/879,554	Applicant(s) DIBB, JAMES E.	
	Examiner Scott T Baderman	Art Unit 2113	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 November 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claim 15 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

The amendment to claim 1 includes all of the limitations taught in claim 15.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

3. Claims 1-3, 6, 7 and 10-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Kedem (6,154,853).

As in claims 1 and 15, Kedem discloses a method for handling a failed disk drive in a redundancy group of disk drives in an array of disk drives, wherein the failed disk drive is located in a failed disk drive slot that comprises creating a mirrored subsystem within the array including a temporary disk drive (spare) and the failed disk drive slot (Figures 4 and 5, Abstract, column 5: lines 5-59, column 6: lines 35-57), and reconfiguring the redundancy group to consist of the disk drives of the redundancy group that have not failed (elements 32, 36 and 38 of Figure 5) and the mirrored subsystem (element 31 of Figure 5), such that the mirrored subsystem is substituted for the failed disk drive (element 34 of Figure 5) in the redundancy group (i.e., if element 34 of Figure 5 should fail, and if the data therein has been copied to element 31 of Figure 5 (mirrored copy), then element 31 of Figure 5 will replace the failed element 34 of Figure 5) (Figure 5, column 5: line 5-66).

As in claims 2 and 14, Kedem discloses inserting a replacement disk drive in the failed disk drive slot, copying data from the temporary disk drive (spare) to the replacement disk drive, and replacing the mirrored subsystem with the replacement disk drive after the data on the replacement disk drive matches the data on the temporary disk drive (i.e., once the data from the spare device has been written to the replaced disk (i.e., it matches) and the parity regenerated for

Art Unit: 2113

all of the logical volumes, the spare device can be returned to an inactive state) (column 6: lines 35-57).

As in claim 3, Kedem discloses reconstructing each data block of the failed disk drive and writing each reconstructed data block to the mirrored subsystem (i.e., if element 34 of Figure 5 should fail prior to copying the data therein to the spare device, the data of element 34 of Figure 5 can be reconstructed and then copied to the spare device) (Figures 4 and 5, column 5: lines 37-59).

As in claims 6, 7, 10, 11, 12 and 13, Kedem discloses that data on each of the disks in the array are copied to spare devices to create a mirrored subsystem, which is exactly what a RAID 1 (and RAID 1/0) array is (Figures 4, 5 and 6, column 5: lines 5-21).

As in claim 16, Kedem discloses a computer implemented method for handling a failed disk drive in a redundancy group of disk drives in an array of disk drives, wherein the failed disk drive is located in a failed disk drive slot that comprises creating a mirrored subsystem within the array using a temporary disk drive (element 31 of Figure 5) and the failed disk drive slot (element 34 of Figure 5) (Figures 4 and 5, Abstract, column 5: lines 5-59, column 6: lines 35-57), reconfiguring the redundancy group to consist of the disk drives of the redundancy group that have not failed (elements 32, 36 and 38 of Figure 5) and the mirrored subsystem (element 31 of Figure 5), such that the mirrored subsystem is substituted for the failed disk drive (element 34 of Figure 5) in the redundancy group (i.e., if element 34 of Figure 5 should fail, and if the data

Art Unit: 2113

therein has been copied to element 31 of Figure 5 (mirrored copy), then element 31 of Figure 5 will replace the failed element 34 of Figure 5) (Figure 5, column 5: line 5-66), and reconstructing each data block of the failed disk drive and writing each reconstructed data block to the mirrored subsystem (i.e., if element 34 of Figure 5 should fail prior to copying the data therein to the spare device, the data of element 34 of Figure 5 can be reconstructed and then copied to the spare device) (Figures 4 and 5, column 5: lines 37-59).

As in claim 17, Kedem discloses inserting a replacement disk drive in the failed disk drive slot, copying data from the temporary disk drive (spare) to the replacement disk drive, and replacing the mirrored subsystem with the replacement disk drive after the data on the replacement disk drive matches the data on the temporary disk drive (i.e., once the data from the spare device has been written to the replaced disk (i.e., it matches) and the parity regenerated for all of the logical volumes, the spare device can be returned to an inactive state) (column 6: lines 35-57).

As in claim 18, Kedem discloses a disk drive array system that comprises a redundancy group comprising at least two disk drives and associated disk drive slots (elements 32, 34, 36 and 38 of Figure 3), a temporary (spare) disk drive with an associated temporary disk drive slot (elements 31, 33 and 35 of Figure 3), logic that detects a failure of one of the disk drives in the redundancy group (column 2: lines 32-35), logic that reconfigures the redundancy group to comprise the disk drives in the redundancy group that have not failed and a second storage array, wherein the second storage array operates as a mirrored subsystem comprising the temporary

Art Unit: 2113

(spare) disk drive and the disk drive slot associated with the failed disk drive (Figures 4-6, column 5: lines 5-59), and logic that reconstructs the data blocks on the failed drive to the mirrored subsystem (Figures 4-6, column 5: lines 37-59).

As in claim 19, Kedem discloses logic that restores the redundancy group to its initial configuration, wherein a replacement disk drive replaces the failed disk drive after the temporary disk drive and a replacement drive inserted in the disk drive slot associated with the failed disk drive contain the same data (column 6: lines 35-57).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 4, 5 8 and 9 are rejected under 35 U.S.C. 103(a) as being obvious over Kedem.

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter

Art Unit: 2113

disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(l)(1) and § 706.02(l)(2).

As in claims 4, 5, 8 and 9, Kedem discloses the method above, which, according to Figures 4 and 5, appear to be a RAID 4 array system (Figures 4 and 5, column 1: lines 5-11). However, Kedem does not clearly disclose a RAID 3 or RAID 5 array.

It would have been obvious to a person skilled in the art at the time the invention was made to include a RAID 3 or RAID 5 array into the method taught by Kedem above. This would have been obvious because a person skilled in the art would have clearly understood that the method taught by Kedem above uses the RAID array configuration (column 1: lines 5-11), and that by implementing a RAID 3 or RAID 5 array system would not have any affect on the method taught by Kedem above. The very fact that Kedem teaches of a RAID array configuration would have led a person skilled in the art to implement the method above into the different levels of the RAID system. This is because RAID 3, 4, 5 and 6 array systems are very similar in that they rely on parity reconstruction to recover data from a failed disk drive. If a

Art Unit: 2113

method applies to one of these type of RAID systems, like that of Kedem above, then a person skilled in the art would have been led to also use the method in the other remaining RAID array levels. (e.g., RAID 3, 5 and 6).

Response to Arguments

6. Applicant's arguments filed November 10, 2004 have been fully considered but they are not persuasive.

With respect to claims 1, 16 and 18, the Applicant argues that Kedem (6,154,853) does not disclose replacing *only* the failed drive with a mirrored subsystem. The Applicant further states that the above claims include a reconfigured group consisting of the working disk drives and a created mirror subsystem because *only* the failed disk drive is mirrored. The Examiner respectfully disagrees. Figure 5 of Kedem clearly teaches of spare device 31 as replacing *only* the failed drive 34. Further Kedem clearly teaches that it could be possible that drive 34 of Figure 5 could fail before the copying process from drive 34 to spare drive 31. In this case, the data of failed drive 34 is reconstructed and then copied to spare drive 31 (Figure 5, column 5: lines 47-54). At this point in the process, the reconfigured redundancy group consist of the disk drives that have not failed (32, 36 and 38) and a mirrored subsystem (31). The Examiner further points out that the only reason that all of the disk drives are copied to spare disk drives (eventually) is to add a layer of protection in case any of the remaining disk drives fail before the failed drive 34 is replaced and its data reconstructed (column 6: lines 1-4).


Art Unit: 2113

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott T Baderman whose telephone number is (571) 272-3644. The examiner can normally be reached on Monday-Friday, 6:45 AM-4:15 PM, first Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Beausoliel can be reached on (571) 272-3645. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Scott T Baderman
Primary Examiner
Art Unit 2113

STB